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Introduction to Anatomy

Anatomy & Physiology

Anatomical terminology, body organization, planes, cavities and positions

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INTRODUCTION TO ANATOMY

B.Sc. Nursing - Applied Anatomy | Chapter 1

1. Definition of Anatomy

Anatomy is the branch of medical science that deals with the study of the structure, shape, size, location and relationship of different parts of the human body.

The word Anatomy is derived from the Greek words:

- Ana = Apart
- Tomy = Cutting

Branches of Anatomy

1. Gross Anatomy: Study of body structures visible to the naked eye.
2. Microscopic Anatomy: Study of structures that require a microscope.
3. Histology: Study of tissues.
4. Cytology: Study of cells.
5. Developmental Anatomy: Study of structural changes from fertilization to adulthood.
6. Embryology: Study of development of the embryo.
7. Regional Anatomy: Study of all structures in a particular body region.
8. Systemic Anatomy: Study of the body system by system.
9. Surface Anatomy: Study of external body landmarks.
10. Radiological Anatomy: Study of body structures using X-rays, CT scans, MRI and ultrasound.

2. Levels of Organization of the Human Body

The human body is organized into six main levels, from simple to complex.

1. Chemical Level: Atoms and molecules form the basic building blocks of the body.
2. Cellular Level: Molecules form cells, which are the basic structural and functional units of life.
3. Tissue Level: Groups of similar cells perform a common function.
4. Organ Level: Different tissues combine to form an organ.
5. Organ System Level: Several organs work together to perform specific functions.
6. Organism Level: All organ systems work together to maintain the complete human body.

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Four Basic Types of Tissues

Tissue

Main Function

Epithelial

Protection, absorption and secretion

Connective

Support, binding and protection

Muscular

Movement and contraction

Nervous

Transmission of nerve impulses

3. Anatomical Position

The anatomical position is the standard reference position used to describe the location of body parts and their relationships.

Characteristics

- Body stands upright.
- Head and eyes face forward.
- Arms are positioned at the sides.
- Palms face forward.
- Fingers are extended.
- Feet are flat and directed forward.

Importance: Anatomical position provides a universal reference for describing body structures and prevents confusion in medical communication.

4. Anatomical Terminology (Directional Terms)

Directional terms describe the location of one body structure in relation to another.

Term

Meaning

Example

Superior

Towards the head or upper part

Head is superior to the chest.

Inferior

Towards the feet or lower part

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Stomach is inferior to the heart.

Anterior

Towards the front

Sternum is anterior to the heart.

Posterior

Towards the back

Spine is posterior to the heart.

Medial

Towards the midline

Nose is medial to the eyes.

Lateral

Away from the midline

Ears are lateral to the eyes.

Proximal

Nearer to the point of attachment

Shoulder is proximal to the elbow.

Distal

Farther from the point of attachment

Fingers are distal to the wrist.

Superficial

Near the body surface

Skin is superficial to muscles.

Deep

Away from the body surface

Bones are deep to muscles.

Ipsilateral

On the same side

Right arm and right leg.

Contralateral

On opposite sides

Right arm and left leg.

Intermediate

Between two structures

Collarbone is intermediate between sternum and shoulder.

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5. Anatomical Planes of the Body

Anatomical planes are imaginary flat surfaces used to divide the body into sections for studying structures and describing movements.

A. Sagittal Plane

Divides the body into right and left portions.

- Median (Midsagittal) Plane: Divides the body into equal right and left halves.
- Parasagittal Plane: Divides the body into unequal right and left portions.

B. Coronal (Frontal) Plane

Divides the body into anterior (front) and posterior (back) portions.

C. Transverse (Horizontal) Plane

Divides the body into superior (upper) and inferior (lower) portions.

D. Oblique Plane

Passes through the body at an angle rather than parallel to the standard anatomical planes.

6. Anatomical Sections

A section is a cut or slice through the body or an organ.

- Longitudinal Section: Cut along the long axis of a structure.
- Cross Section (Transverse Section): Cut perpendicular to the long axis.
- Oblique Section: Cut at an angle to the long axis.

7. Body Cavities

Body cavities are spaces within the body that contain, support and protect internal organs.

They are divided into two major groups:

A. Dorsal Body Cavity

Located along the posterior side of the body.

1. Cranial Cavity
   - Located inside the skull.
   - Contains the brain.
   - Protects the brain from injury.
2. Vertebral (Spinal) Cavity
   - Located within the vertebral column.
   - Contains the spinal cord.
   - Protects the spinal cord.

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B. Ventral Body Cavity

Located along the anterior side of the body.

1. Thoracic Cavity

- Located in the chest.
- Contains the lungs and heart.
- Separated from the abdominal cavity by the diaphragm.

The thoracic cavity includes:

- Right and left pleural cavities: Contain the lungs.
- Mediastinum: Central region between the lungs.
- Pericardial cavity: Contains the heart.

2. Abdominopelvic Cavity

It is divided into:

a. Abdominal Cavity

- Contains the stomach, liver, spleen, pancreas, intestines and kidneys.

b. Pelvic Cavity

- Contains the urinary bladder, internal reproductive organs and rectum.

8. Serous Membranes

Serous membranes are thin membranes that line certain body cavities and cover the organs within them. They produce serous fluid to reduce friction during organ movement.

Membrane

Location

Pleura

Surrounds the lungs

Pericardium

Surrounds the heart

Peritoneum

Lines the abdominopelvic cavity and covers many abdominal organs

Each serous membrane has:

- Parietal Layer: Lines the cavity wall.
- Visceral Layer: Covers the organ.

9. Abdominal Regions

For clinical examination, the abdomen is divided into nine regions.

Right Side

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Middle

Left Side

Right Hypochondriac

Epigastric

Left Hypochondriac

Right Lumbar

Umbilical

Left Lumbar

Right Iliac (Inguinal)

Hypogastric

Left Iliac (Inguinal)

Clinical Importance

- Epigastric: Common site of upper abdominal discomfort.
- Umbilical: Region around the navel.
- Right hypochondriac: Contains most of the liver and gallbladder.
- Right iliac: Contains the appendix region.

10. Four Quadrants of the Abdomen

The abdomen can also be divided into four quadrants using a vertical and horizontal line crossing at the umbilicus.

Quadrant

Major Organs

Right Upper Quadrant (RUQ)

Liver, gallbladder, right kidney and parts of intestine

Left Upper Quadrant (LUQ)

Stomach, spleen, left kidney and parts of pancreas

Right Lower Quadrant (RLQ)

Appendix, caecum and parts of small intestine

Left Lower Quadrant (LLQ)

Sigmoid colon and parts of small intestine

Clinical Importance: Abdominal regions and quadrants help healthcare professionals identify and document the location of pain, tenderness and other clinical findings.

11. Body Organization by Organ Systems

The human body consists of 11 major organ systems.

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Organ System	Main Function
Integumentary	Protects the body through skin, hair and nails
Skeletal	Supports the body and protects organs
Muscular	Produces movement and maintains posture
Nervous	Controls and coordinates body activities
Endocrine	Regulates functions through hormones
Cardiovascular	Transports blood, oxygen and nutrients
Lymphatic/Immune	Provides immunity and returns tissue fluid to blood
Respiratory	Exchanges oxygen and carbon dioxide
Digestive	Digests food and absorbs nutrients
Urinary	Removes waste and regulates fluid balance
Reproductive	Responsible for reproduction

12. Importance of Anatomy in Nursing

Anatomy is essential in nursing because it helps nurses to:

1. Understand the normal structure of the human body.
2. Identify the location of organs and body systems.
3. Perform physical assessments accurately.
4. Administer injections at appropriate anatomical sites.
5. Understand the effects of diseases and injuries.
6. Provide safe patient care during procedures.
7. Understand medical terminology and diagnostic reports.

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8. Communicate effectively with other healthcare professionals.

13. Important Examination Questions

Long Answer Questions

1. Define anatomy and explain its branches.
2. Describe the levels of structural organization of the human body.
3. Explain the anatomical position and directional terms.
4. Describe the anatomical planes with examples.
5. Classify body cavities and explain their contents.

Short Answer Questions

1. Define anatomical position.
2. What is a sagittal plane?
3. Differentiate between proximal and distal.
4. Name the three major serous membranes.
5. What are the four basic types of tissues?
6. Name the nine abdominal regions.
7. Differentiate between dorsal and ventral body cavities.

Very Short Answer Questions

1. What is anatomy?
2. What is histology?
3. Which cavity contains the brain?
4. Which membrane surrounds the lungs?
5. Which muscle separates the thoracic and abdominal cavities?
6. What is the anatomical term for towards the midline?
7. What does distal mean?

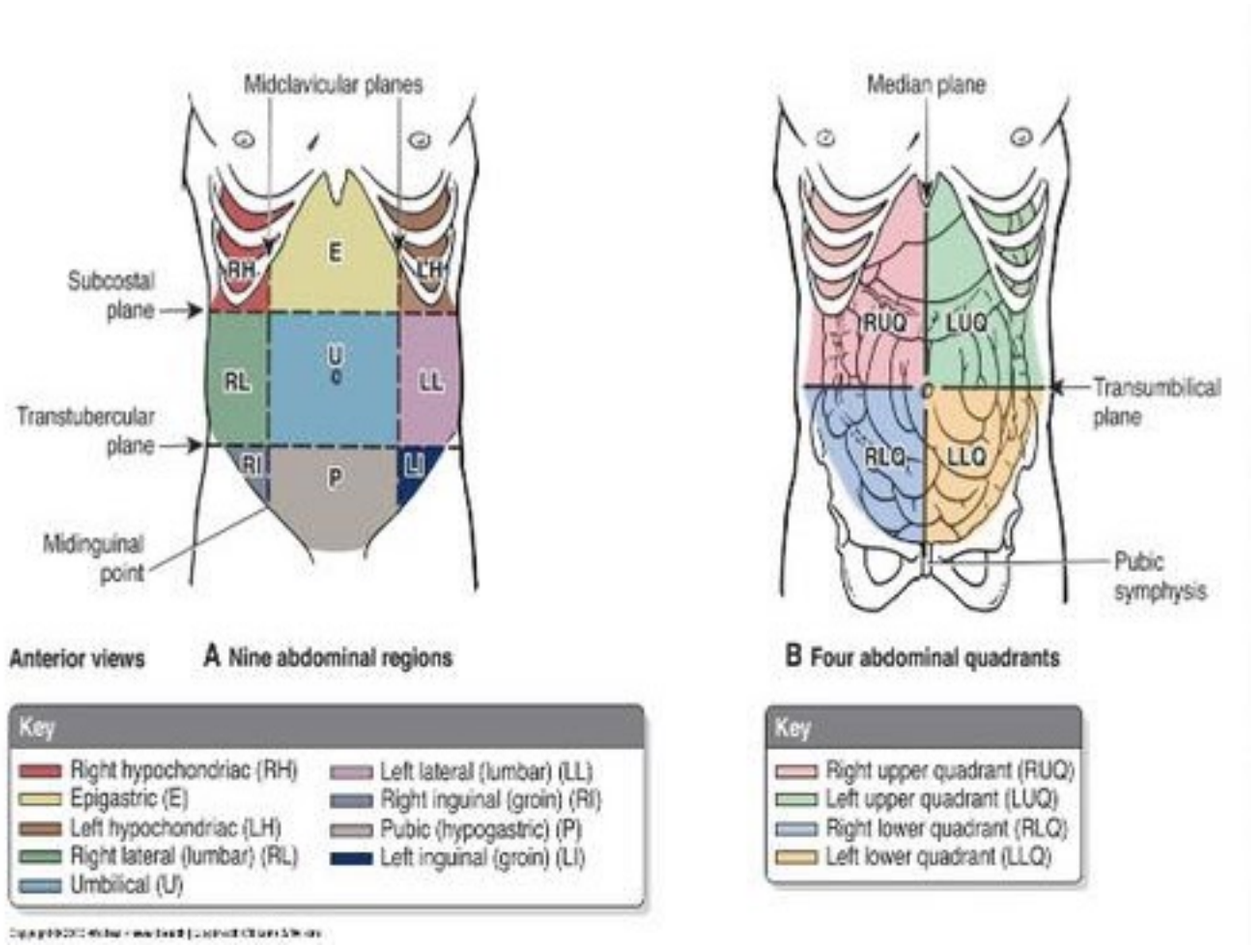
14. Quick Revision

- Anatomy: Study of body structure.
- Cell: Basic structural and functional unit of the body.
- Four basic tissues: Epithelial, connective, muscular and nervous.
- Anatomical position: Standing upright, facing forward, palms forward.
- Sagittal plane: Divides right and left.
- Coronal plane: Divides anterior and posterior.
- Transverse plane: Divides superior and inferior.

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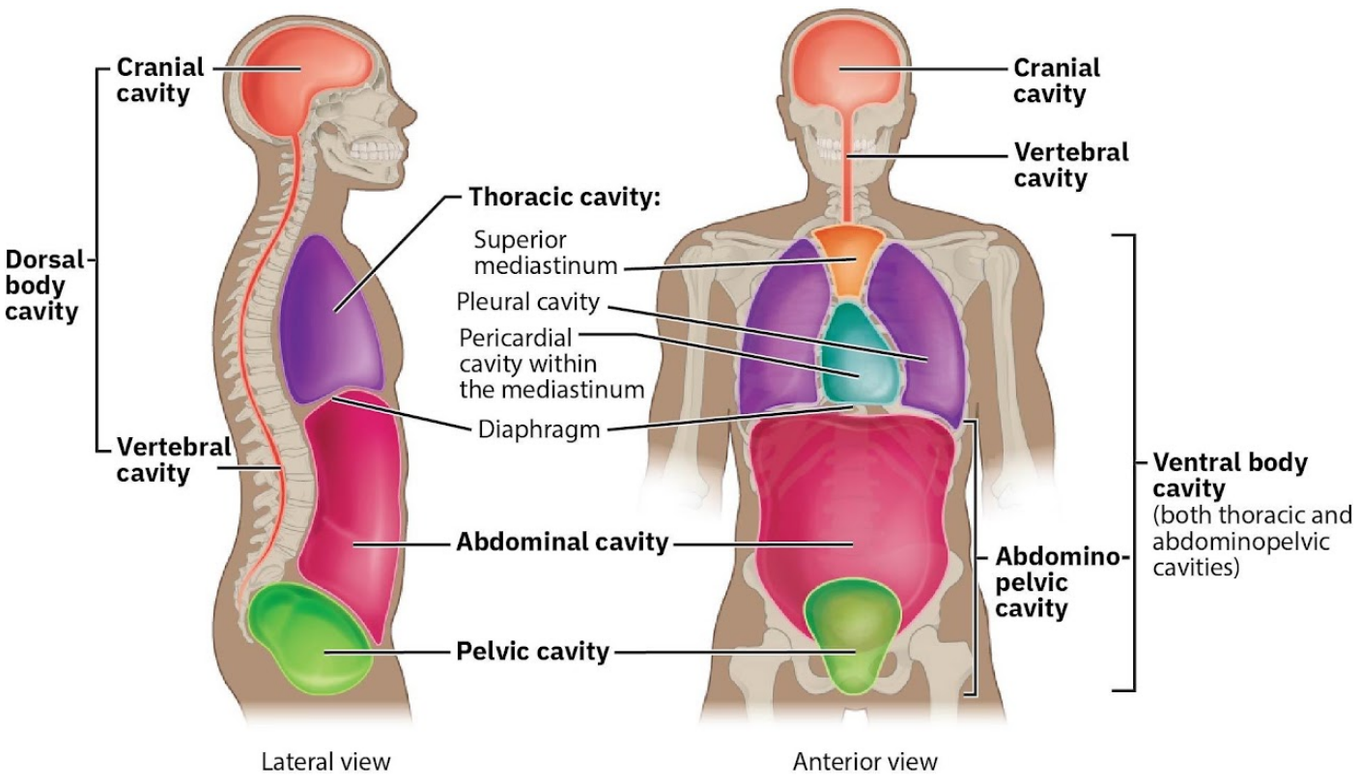
- Dorsal cavity: Cranial and vertebral cavities.
- Ventral cavity: Thoracic and abdominopelvic cavities.
- Pleura: Membrane surrounding lungs.
- Pericardium: Membrane surrounding heart.
- Peritoneum: Serous membrane of the abdominopelvic cavity.
- Diaphragm: Separates thoracic and abdominal cavities.
- Four basic tissue types: Epithelial, connective, muscular and nervous.

Conclusion: Anatomy provides the foundation for understanding the structure of the human body. Knowledge of anatomical terminology, positions, planes, cavities and organ systems is essential for accurate nursing assessment, clinical procedures and patient care.

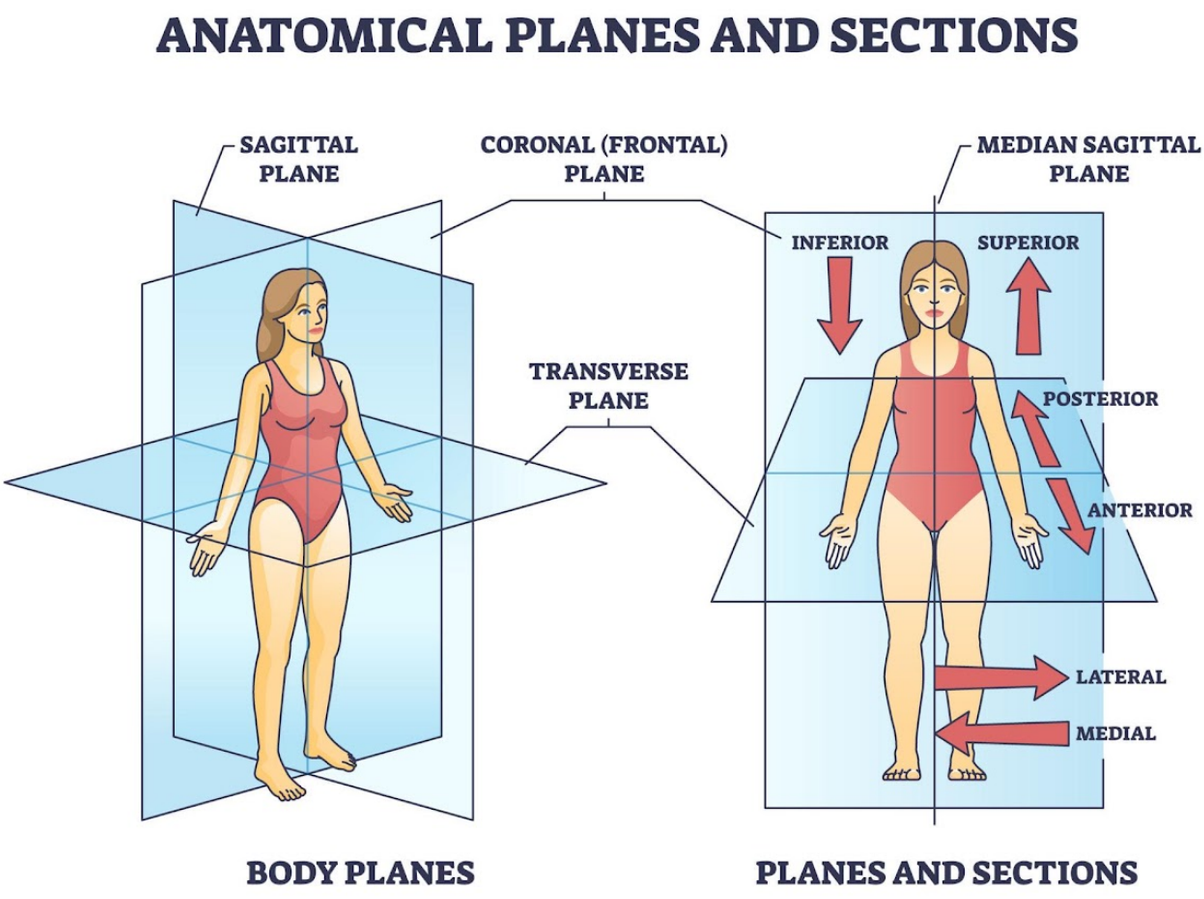


Introduction to Anatomy - illustration 1

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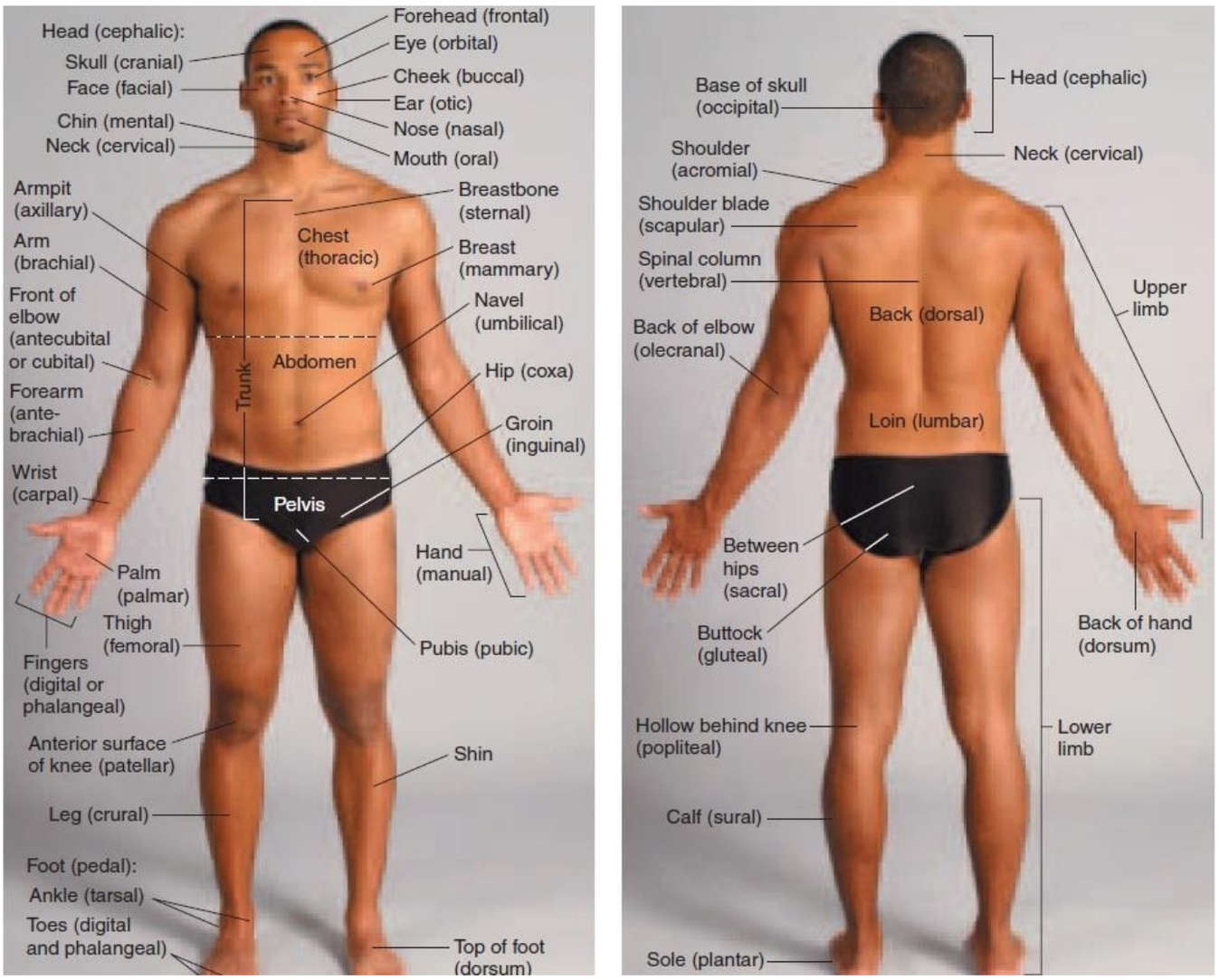


Introduction to Anatomy - illustration 2



Introduction to Anatomy - illustration 3

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Introduction to Anatomy - illustration 4

Quick Revision

- Anatomical position & directions: Anatomy studies body structure. In the reference position, the body is upright, eyes forward, arms at the sides and palms forward. Right and left always refer to the person being described.

- Planes, cavities & positions:

- Cells, tissues & organization: Chemical level -> cell -> tissue -> organ -> organ system -> organism. The cell membrane encloses cytoplasm and organelles; the nucleus contains most genetic material. Mitosis forms daughter cells for growth and repair; meiosis produces haploid gametes.

- Movement, glands & cartilage:

Examination questions

1. Describe anatomical position before using directional terms.

2. Compare sagittal, coronal and transverse planes.

3. Classify four tissues and give one location for each.

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Practice questions

Choose one best answer. The answer key and explanations follow the questions.

1. Which plane divides the body into anterior and posterior portions?

A. Sagittal

B. Coronal

C. Transverse

D. Midsagittal

2. The wrist is ___ to the elbow.

A. Proximal

B. Medial

C. Distal

D. Superior

3. Which tissue lines body surfaces and cavities?

A. Epithelial

B. Muscle

C. Nervous

D. Bone

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Answer key and explanations

1. B - Coronal

The coronal (frontal) plane separates front and back portions.

2. C - Distal

Distal means farther from the limb's attachment.

3. A - Epithelial

Epithelium forms coverings, linings and glands.

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